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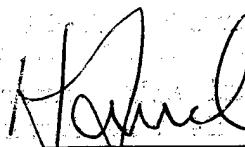
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## I. INTRODUCTION

Endocrine gland dysfunction occurs with a striking predilection for women (1). These disorders are particularly prevalent in the third to fifth decades of life--an age range encompassing the majority of active duty female personnel. These gender differences are due in part to a much higher prevalence of autoimmune conditions in women, which include many common endocrine disorders.

The general availability of synthetic hormones for the replacement of endocrine deficiencies has permitted a near-normal lifestyle for hundreds of thousands of individuals who would otherwise have experienced an increased morbidity and mortality as a result of deficient glandular function. However, a satisfactory outcome in these individuals is contingent upon accurate diagnosis, continuous monitoring for adequacy of replacement therapy, and careful avoidance of hormonal over-replacement or toxicity (2).

The delivery of replacement therapy to patients afflicted with deficient hormonal production entails a commitment to lifelong monitoring for adequacy of replacement and avoidance of toxicity due to over-replacement. Common hormonal deficiencies such as for thyroid hormone, estrogen, parathyroid hormone, and in some cases pituitary and adrenal hormones, do not prevent retention on active duty. The military setting, however, presents unique challenges to the delivery of adequate health care to these individuals. Frequent soldier relocations with interrupted continuity of care, assignments to duty stations with limited access to specialty or subspecialty care, and deployment to remote locations far-removed from all but urgent medical care may make adequate surveillance problematic. These concerns are compounded by the fact that a number of adverse effects associated with hormonal deficiencies (under-replacement) or toxicity (over-replacement) may particularly impair the functionality of active duty service personnel.

Prior to the present study, no medical database for active duty female personnel afflicted with endocrine organ deficiency has been described, and no previous study has documented the prevalence of endocrine deficiency in this study population. The adequacy of replacement therapy, accessibility to medical care, and the effects of endocrine deficiency on deployability have also not been previously investigated. The present study was therefore undertaken with the objective of establishing a computerized database for active duty service women with endocrine gland deficiency in order to define further each of these factors in the study population.

## **II. BODY**

### **A. Establishment of the Endocrinology Clinic Database (ECD)**

The Endocrinology Clinic at Walter Reed Army Medical Center maintains a convenience file for each patient evaluated and followed by physicians on our staff. These convenience files number nearly 9,000. In August 1993, the process of assigning endocrine diagnostic codes for each convenience file was begun. Over a two year period, data checklists containing 130 endocrine diagnoses and blank spaces for demographic information were completed for each convenience file and the information thus obtained was entered into a computerized database. The demographic information for patients listed in the Composite Health Care System (CHCS) as having received care in the Endocrinology clinic in the period from August 1990 to August 1993 was downloaded to a spool file, edited in a word processing program (Microsoft Word for Macintosh), and imported into the Microsoft Excel Spreadsheet program, to facilitate further data entry. Demographics from patients not downloaded from CHCS were extracted from the convenience file and entered manually. At the inception of the current study, the ECD was approximately 50% complete. As such, initial efforts focused on the completion of the ECD, from which patients were ultimately obtained for the servicewomen with endocrine deficiency (SWED) database. **Figure 1** shows the distribution of endocrine disorder by broad category of disease for all patients followed in the Endocrinology clinic at Walter Reed.

### **B. Formation of the servicewomen with endocrine deficiency (SWED) database**

Upon completion of the ECD, computerized entries were sorted according to gender, family prefix, and age, to define the group of women eligible for enrollment in the SWED. Women identified in this fashion were sent letters requesting their consent for participation in the study. Women giving consent for inclusion in the SWED were asked to complete a questionnaire providing information pertaining to assignment restrictions and perception of accessibility of care during the course of their military care. A comparison of the required level of care (**Appendix 1**) to that available at each duty assignment was calculated. The information above was also entered into the SWED. **Figure 2** shows the yield in terms of potential SWED patients at each step of the exclusion process. It can be

seen that active duty servicewomen with endocrine deficiencies who could be tracked through a local address or through the U.S. Army Personnel Locator (Ft. Benjamin Harrison, Indianapolis, IN), represented an unexpectedly small subpopulation within the ECD. To assist in the analysis of the parameters chosen for elaboration in the present study, dependent wives of active duty servicemen were therefore also included in the study population, since these patients are subject to many of the same potential assignment restrictions as active duty servicewomen.

#### **C. Descriptive Data for Patients Contained in the SWED**

At the time of this writing, the SWED consists of 58 women with endocrine gland deficiency, 91% had thyroid abnormalities. Among the latter group, 53% were known to have autoimmune thyroid disease (Graves' disease or Hashimoto's thyroiditis). **Figure 3** shows that the vast majority of SWED patients had thyroid disorders. Patients ages ranged from 24 to 62, with an average age of  $42 \pm 7$  years (**Figure 4**).

#### **D. Timeliness of Endocrine Deficiency Recognition in SWED Patients**

SWED patients reported symptoms for an average of 10.6 months (range 0-96 months) before a specific diagnosis of endocrine deficiency was made.

#### **E. Adequacy of Medical Care Delivered to SWED Patients**

##### **1. Comparison of Actual to Ideal Level of Care Available for Condition**

**Figure 5** compares the actual level of medical care available to the patient since the diagnosis of endocrine gland deficiency, to the ideal level of care (Appendix 1) for their individual disorder. The majority of respondents (21 of 24) received care at or above the ideal level for their endocrine disorder.

##### **2. Comparison of Actual to Ideal Follow-up Intervals in SWED Patients**

**Figure 6** shows the reported follow-interval for patients in the SWED. **Figure 7** summarizes the comparison of the actual follow-up interval to that recommended for each patient's condition. It can be seen that 100% of patients were seen at intervals which met or surpassed ideal follow-up for the condition listed.

##### **3. Availability of endocrine prescription medications at duty stations**

Patients were asked to rate the overall availability of replacement hormone therapy at their duty stations during their career from very poor (1) to fair (3) to excellent (5). The results of this survey are shown in **Figure 8**. It can be seen from **Figure 8** that 77% of SWED patients rated prescription availability as good or excellent, 13% as fair, and 10% as poor or very poor. Patients were next asked to give the longest period when they were forced to go without endocrine prescriptions. This ranged from none (53%), to  $\leq 1$  week (20%), to 1 week-1 month (11%), 1 month- 1 year (13%) to  $> 1$  year (4%). Patients going longer than 1 week without medications gave the following explanations: no doctor appointment or drug not available (55%), medication discontinued for testing purposes (20%), forgot to take medication (10%), wrong medication given (5%), no time to pick up medication (5%), and medication no longer needed (5%).

#### **4. Overall Patient Perception of Quality of Care Rendered in the Military for Endocrine Condition**

Patients were asked to rate the overall quality of care received from very poor (1) to fair (3) to excellent (5). The average score was 4.3. The distribution of the patient response is shown in **Figure 9**. Patients described their care as excellent (63%), good (19%), fair (11%), poor or very poor (8%).

#### **F. Assignment Limitations Due to Endocrine Deficiency**

Six of 58 (10.3%) patients reported assignment limitations due to their endocrine gland deficiency, including 2 active duty patients not deployed to the field, 1 active duty service woman who required limited duty, 1 active duty woman who required preapproval before all OCONUS tours, and 2 dependent wives whose active duty husband had assignment limitations as part of the Exceptional Family Member Program due to the patient's endocrine condition. One additional active duty service woman had assignment limitations imposed by a coexistent medical condition (Hodgkin's disease). Patients were next asked to rate the effect of their endocrine deficiency on their deployability during their active duty career, from no limitation (1) to a severe restriction (5). The average response from 32 respondents was 1.75, with 72% of women reporting no assignment limitation, 16% reporting mild to moderate restriction, and 9% reporting a severe restriction due to their endocrine condition.

### III. CONCLUSIONS

The current report allows several important conclusions regarding endocrine gland deficiencies in active duty servicewomen and dependent wives of active duty servicemen. First, endocrine gland deficiencies represent a common group of disorders in patients seen in the Endocrinology clinic at the Walter Reed Army Medical Center. Thyroid disorders are particularly common, accounting for over 90% of patients in the SWED database. Among these, autoimmune thyroid disease accounts for 53% of cases. Since many patients listed in the database as simple hypothyroidism are likely to have the autoimmune disorder Hashimoto's thyroiditis, thyroid autoimmunity probably accounts for nearly 75% of SWED database patients. In light of this finding, it is perhaps not surprising that the age range for SWED database patients (25-55 years old) corresponds to the peak incidence of autoimmune thyroid disorders.

The adequacy of care provided to servicewomen with endocrine gland deficiencies, as assessed by the timeliness with which the diagnosis was made, the appropriateness of available medical care, the interval between follow-up evaluations, and the availability of endocrine medications, was encouraging. However, a surprisingly large number (55%) of patients experienced significant delays in receiving necessary medications due to inability to make a doctor's appointment or inadequate pharmacy stock at their duty assignment. This very important area should be targeted for future improvement in active duty servicewomen.

The current study also provides insight into the problems associated with establishing medical databases for active duty military personnel. Despite the fact that nearly 800 women (200 active duty, 600 dependent wives of active duty servicemen) qualified for entry into the SWED database, less than 10% of these patients could be located using the last known address or the U.S. Army Personnel Locator service, and/or were willing to be included in the database. However, the retrospective nature by which patients were accrued for this study is the major contributor to this difficulty. The addition of further patients to this database in a long-term, prospective nature will greatly increase the power of the conclusions able to be drawn from this study.

**REFERENCES**

1. Becker KL, et al. Endocrinology and the endocrine patient. In: Becker E. (Ed), Principles and Practice of Endocrinology and Metabolism, Second Edition, J.B. Lippincott Publishing Company, Philadelphia, 1995, pp2-6.
2. Burch HB, Wartofsky L. Hyperthyroidism. In: Current Therapy in Endocrinology and Metabolism, Fifth Edition, Bardin (ed), B.C. Decker Inc, Philadelphia. 1994, pp 64-70.

**APPENDIX 1**

**RECOMMENDED FOLLOW-UP INTERVALS AND LEVEL OF CARE FOR  
PATIENTS WITH ENDOCRINE GLAND FAILURE†**

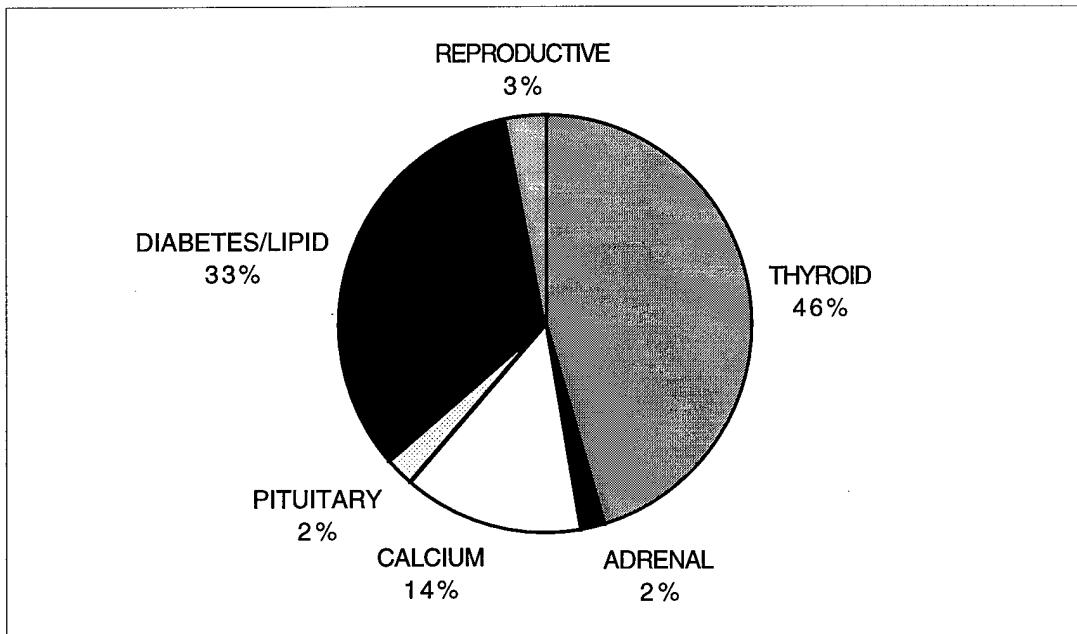
<b>Deficient hormone</b>	<b>Recommended interval between physician visits</b>			<b>Recommended level of care at duty station*</b>		
	$\geq 3$ mo < 6 mo	$\geq 6$ mo < 12 mo	$\geq 12$ mo	GMO	MEDDAC	MEDCEN
Antidiuretic hormone	✓				✓	
Panhypopituitarism	✓				✓	
Thyroid hormone			✓	✓		
Parathyroid hormone	✓				✓	
Cortisol	✓				✓	
Aldosterone	✓				✓	
Insulin	✓			✓		
Estrogen			✓	✓		

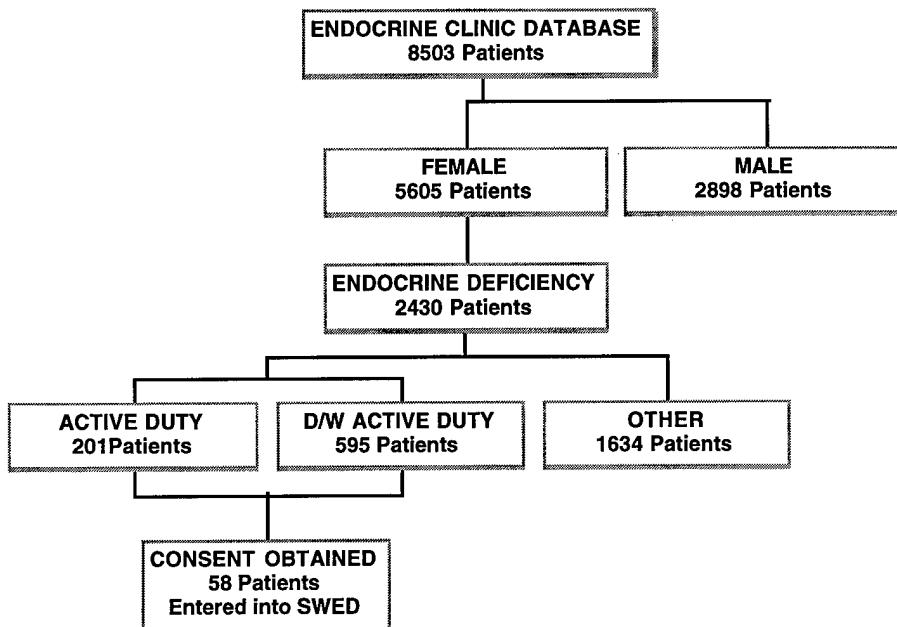
† These criteria were established through a questionnaire completed by a panel of 8 board certified Endocrinologists (unpublished data, Burch HB).

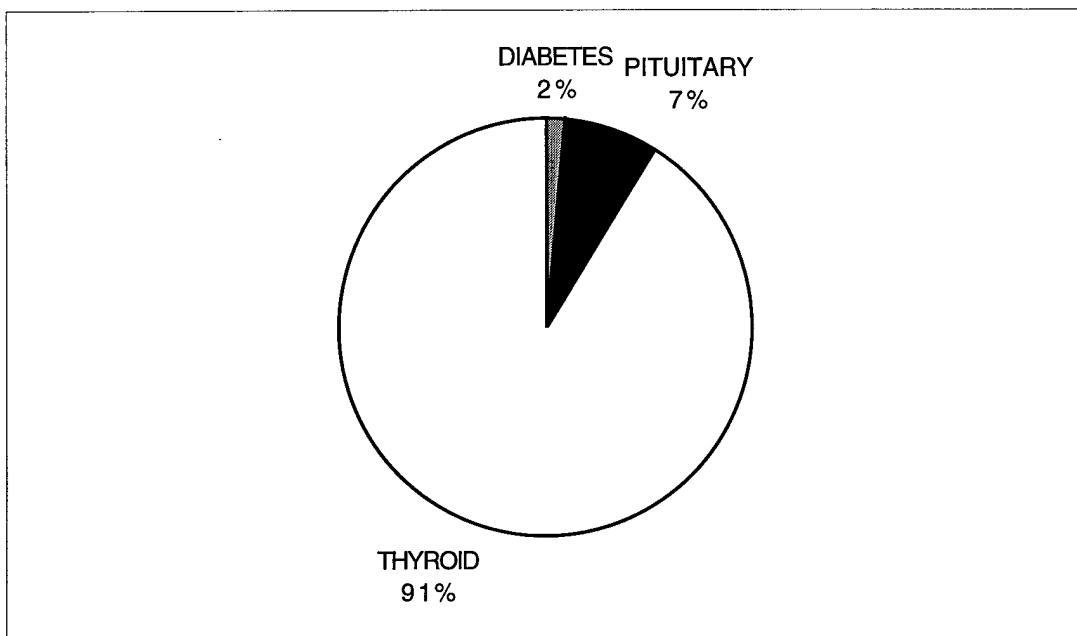
\*GMO: Troop medical clinic /general medical officer; field level

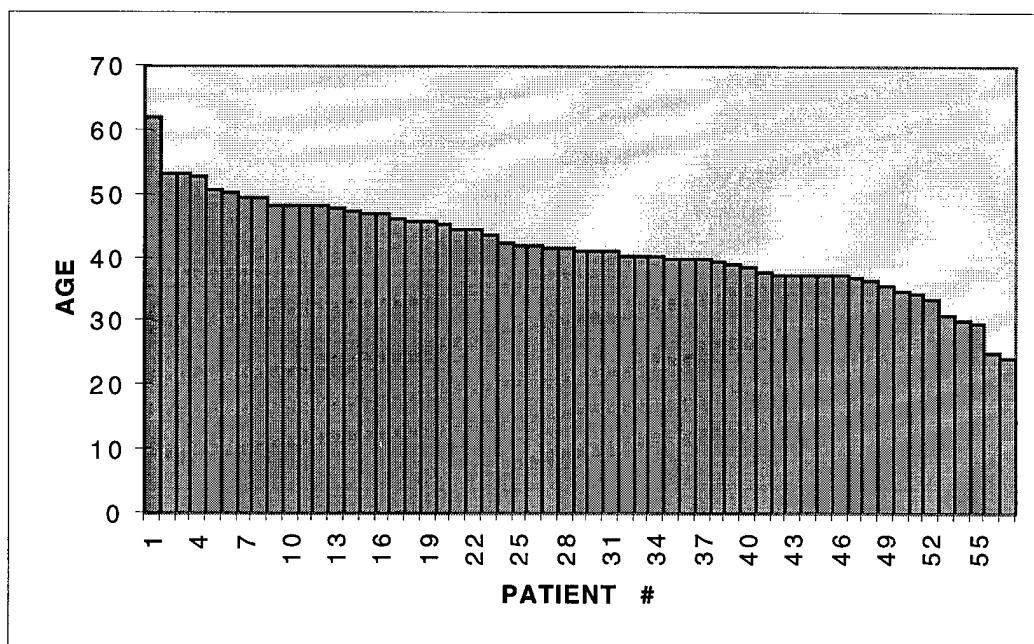
MEDDAC: primary care (internal medicine, family practice) or Obstetrics-Gynecology; MEDDAC level

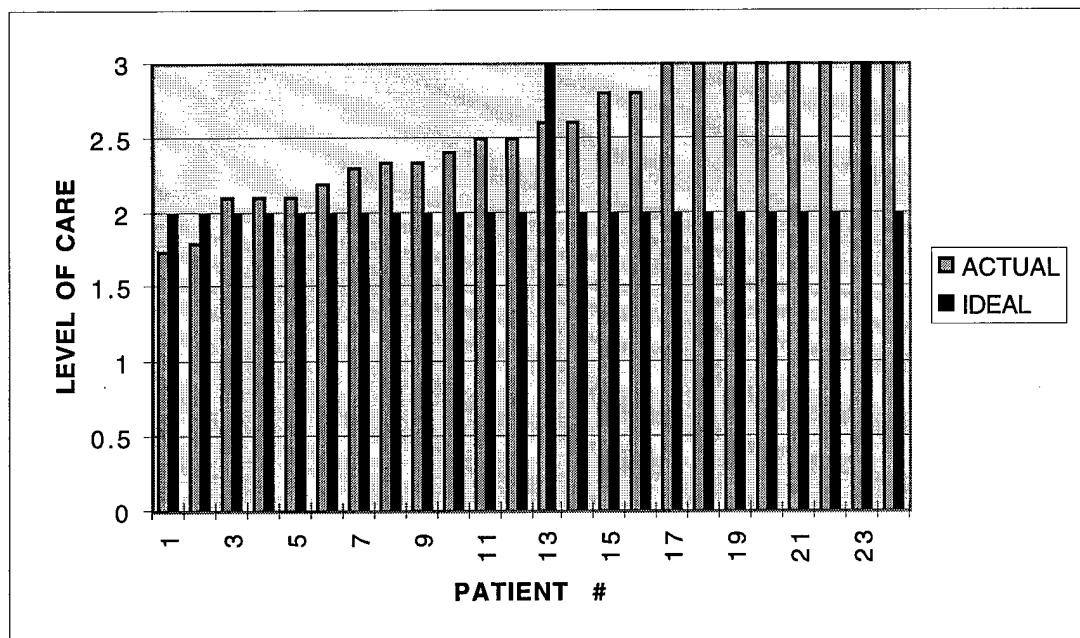
MEDCEN: Endocrinologist, Reproductive endocrinologist

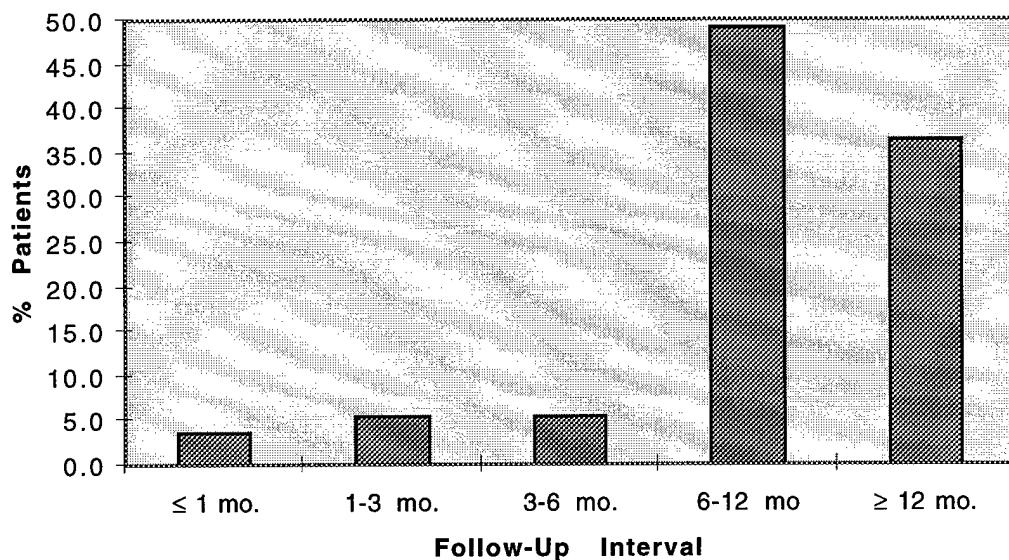
**FIGURE 1****DISTRIBUTION OF DISORDERS IN ENDOCRINE CLINIC  
PATIENTS AT WRAMC**

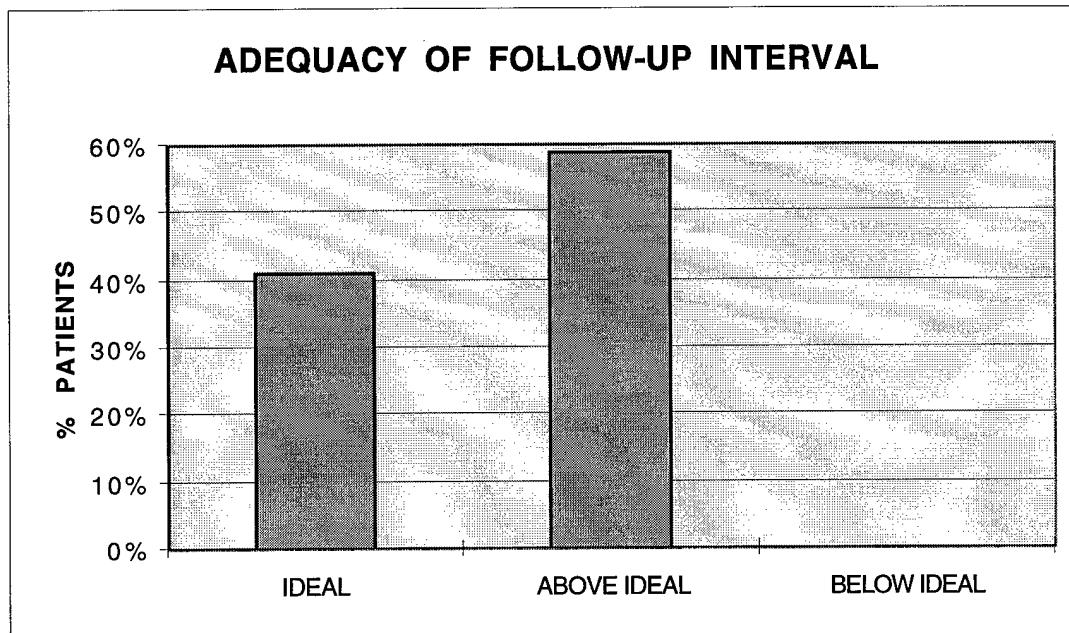
**FIGURE 2****SELECTION OF PATIENTS FOR THE SWED DATABASE**

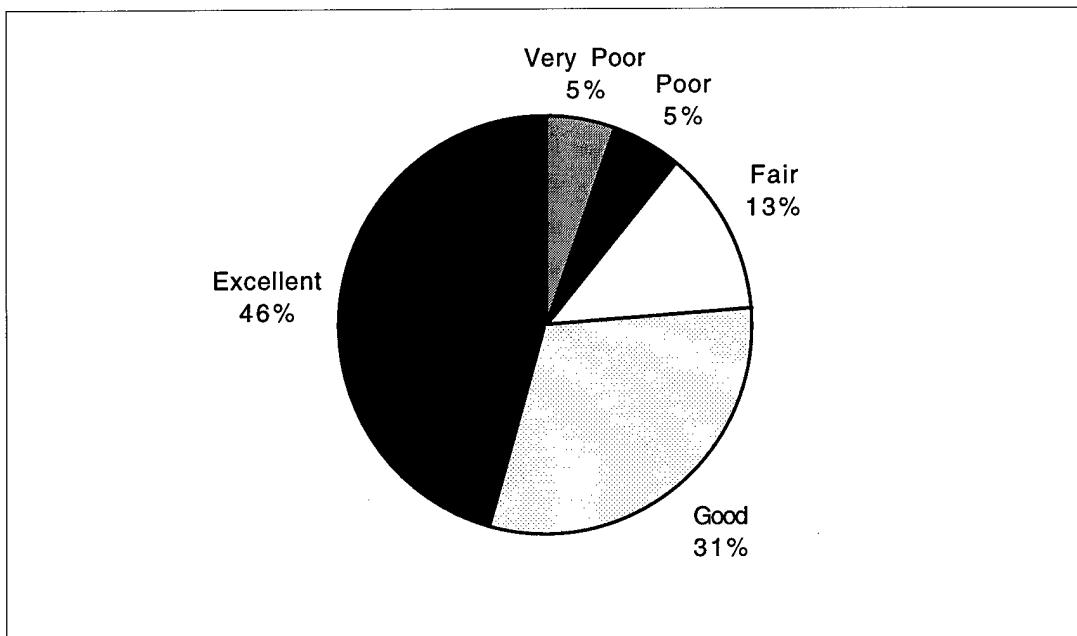
**FIGURE 3****DISTRIBUTION OF ENDOCRINE GLAND DYSFUNCTION IN SWED DATABASE PATIENTS**

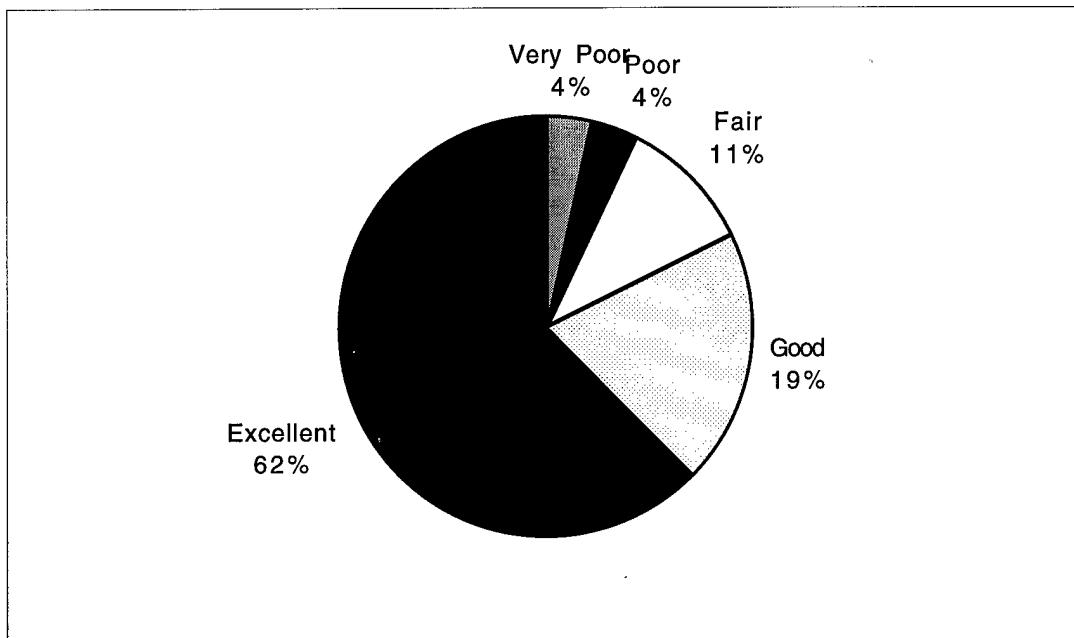
**FIGURE 4****AGE OF PATIENTS INCLUDED IN THE SWED DATABASE**

**FIGURE 5****COMPARISON OF AVAILABLE TO RECOMMENDED LEVEL OF CARE**

**FIGURE 6****FOLLOW-UP INTERVALS IN SWED PATIENTS**

**FIGURE 7**

**FIGURE 8****PATIENT RATING OF ENDOCRINE PRESCRIPTION AVAILABILITY AT DUTY STATIONS DURING THEIR CAREER**

**FIGURE 9****PERCEIVED OVERALL QUALITY OF CARE RECEIVED FOR  
ENDOCRINE CONDITION IN THE MILITARY**

## LEGENDS TO FIGURES

### **Figure 1**

Distribution of disorders in endocrine clinic patients at WRAMC.

### **Figure 2**

Selection of patients for the SWED database. Active duty servicewomen and dependent wives of active duty servicemen were selected from the Endocrinology clinic database.

### **Figure 3**

Distribution of endocrine gland dysfunction in swed database patients. The overwhelming majority of patients have thyroid disorders.

### **Figure 4**

Distribution of ages of patients included in the SWED database

### **Figure 5**

Comparison of available to recommended level of care for patients in the SWED database. The patients' reports of the level of care available at current and prior installations at which she served was compared to the recommended level of care for each patient's endocrine disorder. The ideal level of care was established as described in Appendix 1.

### **Figure 6**

Follow-up intervals in swed patients.

### **Figure 7**

The patients' reports of the interval between follow-up visits at current and prior installations at which she served was compared to the recommended care intervals for each patient's endocrine disorder. The ideal intervals were established as described in Appendix 1.

### **Figure 8**

Patient rating of endocrine prescription availability at duty stations during their career.

**Figure 9**

Perceived overall quality of care received for endocrine condition in the military.

**PUBLICATIONS**

1. Burch HB, Hanopole SH. Endocrine deficiency in the servicewoman: An assessment of prevalence, adequacy of therapy, and impact on deployability in patients evaluated at the Walter Reed Army Medical Center Endocrinology Clinic. Manuscript in preparation.